

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

VOL. XIII, No. 19, pp. 305-324.

NOVEMBER 21, 1924

XIX

**PARASITIC BEES (EPEOLINÆ AND MELECTINÆ)
IN THE COLLECTION OF THE CALIFORNIA
ACADEMY OF SCIENCES**

BY

T. D. A. COCKERELL AND GRACE SANDHOUSE*

In American Museum Novitates, No. 23 (1921) it was remarked that the Rocky Mountains apparently constituted the greatest center for Epeolines in the world, Colorado having no less than 32 species. It now appears that this supremacy may be disputed, or shared with the Pacific Coast Region, which is similarly rich in species. The collections of the California Academy of Sciences cannot be complete for the region, yet they reveal an astonishing number of endemic forms, all apparently distinguished by perfectly recognizable characters. On the other hand *Pseudomelecta* and *Zacosmia*, so far as the material shows, present no novelties and are very poor in species. It is not at first evident why the wide spread and abundant *Pseudomelecta californica* has remained true to type, while the Epeolines have undergone great specific diversification. It may be surmised, however, that the Epeolines have been long

*Before leaving Boulder in June, Miss Sandhouse had finished the Melectines and had done about half the work on the Epeolines. Completing the work at the California Academy of Sciences I have to be responsible for its final form, but it is in every sense a joint production. A few species were not studied by Miss Sandhouse and I am alone responsible for their separation and description as is duly indicated.—T. D. A. C.

November 21, 1924

in the country while *Pseudomelecta* may represent a comparatively recent invasion from Asia. It is very much to be desired that the life histories of these bees should be made known, but this work must be done by resident entomologists.

EPEOLINÆ

1. *Triepeolus concavus* (Cresson)

California: Western San Joaquin Co., July 15 to Sept. 15, 1909, one female; Utah: Kings Station, Davis Co., July 24, 1922 (Van Duzee), one male.

2. *Triepeolus lineatulus* Cockerell & Sandhouse, new species

Female (type): Length 9-11 mm. Black, including labrum, mandibles, antennæ, tegulæ, legs and spurs, only the mandibles faintly reddish in middle and the small joints of tarsi red; ornaments of thorax and abdomen very pale ochreous; eyes green. Clypeus minutely rugose with scattered shallow punctures and a smooth median line; supraclypeal area dull, contrasting with the shining upper part of clypeus; region between antennæ and orbits densely covered with white hairs; ornaments on thorax above consisting of a narrowly interrupted band on prothorax, two rather broad parallel stripes on mesothorax, reaching anterior margin, but sharply defined and not connecting with each other or spreading laterally; also large triangular patches at anterior lateral corners of mesothorax, and a broad band along hind margin of mesothorax, invading scutellum in middle; mesopleuræ black, dull and densely rugosopunctate, with a broad, transverse, clean-cut ochreous band on its upper part, this connected anteriorly with an upward band to tegulæ; scutellum bigibbous, axillæ pointed; wings dilute brown; legs without distinct patches of hair, middle tibiæ with a band of reddened hair along anterior margin; abdomen with broad pale ochreous bands, the anterior and posterior ones on first segment narrowly interrupted; dark band on first segment elongate, transverse, broad, obtuse at ends; lower lateral corners of dark area on second segment forming acute angles (about 50°); venter entirely black, its last segment straight in profile.

Male: Length 9 to 10 mm. Similar to female in most respects. Smooth line on clypeus poorly developed but perceptible; bands on mesothorax anteriorly broader, sometimes connected with anterior lateral patches, in which case a round dark spot is left on front margin of mesothorax; mesopleura with a broad pale band all the way down its anterior margin;

anterior pale band on first abdominal segment entire or narrowly interrupted; pale abdominal bands narrower; vertex with two pale bands, interrupted in middle; apical plate black, rather broad.

Type: Female, No. 1598, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, August 20, 1919, at Stockton, California. *Paratypes*, two males, same data; also two females, Western San Joaquin Co., Calif., July 15-November 15, 1909.

In my key (Amer. Mus. Novitates, No. 23) this runs to *T. rectangularis* Ckll. but is easily distinguished by the markings of the abdomen and entirely black antennæ.

3. *Triepeolus vandykei* Cockerell & Sandhouse, new species

Female: Length 10.5-11 mm.; black including labrum, mandibles, antennæ, tegulæ, legs and spurs, but mandibles obscurely reddened in middle; apical part of third antennal joint dusky red; eyes pea-green; clypeus and supra-clypeal area sculptured alike, rugoso-punctate, somewhat glistening, with scattered shallow punctures; no smooth line on clypeus, but a little pit with smooth margins at upper margin in middle; scape curved; sordid white hair around base of antennæ; ornaments of thorax and abdomen pale ochreous; band on upper margin of prothorax rather narrow and continuous; stripes on anterior part of mesothorax parallel, reaching anterior margin, but rather weak and inconspicuous, rather dilated posteriorly, so that their inner margins converge caudad; marks of anterior lateral corners of mesothorax narrow, cuneiform, widely separated from median stripes; suture very slender; scutellum only feebly bigibbous; upper half of mesopleura with tubercles, entirely covered with hair, lower half bare, coarsely punctured, shining between the punctures; margins of tegulæ broadly obscure reddish; wings dilute brownish; middle and hind tibiæ with minute silvery pubescence on outer side, middle tibiæ with line of red hair anteriorly; basitarsi with rusty black hairs on inner side; first abdominal segment with posterior band showing a linear interruption, anterior band hardly or not interrupted, the black area transverse, round at ends, very broadly subangulate in front; bands on segments 2-4 entire, very broad; posterior lateral corners of black on second segment rectangular; fifth segment with an obscure spot on each side; venter entirely black.

Type: Female, No. 1599, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, September 1, 1912, at Millbrae, San Mateo Co., California. *Paratype*, one female, same data.

Runs in my table to *T. lestes* Ckll., but easily separated by color of eyes and ornamentation of pleura.

4. *Triepeolus pallidiventris* Cockerell & Sandhouse, n. sp.

Male: Length about 11 mm.; robust, black, including labrum, mandibles, antennæ, tegulæ, legs and spurs, the small joints of tarsi obscurely reddish; eyes sea-green; dense hair around antennæ pure white; clypeus glistening, minutely rugoso-punctate, with no smooth line, with secondary punctures small and evanescent; hair of thorax white, fringed with ochreous dorsally, abdominal bands pale ochreous; band on upper margin of pleura entire; mesothorax covered with pale appressed hairs, except a large trilobed area involving the posterior disc, its median lobe (anteriorly) not much larger than the others, and not at all approaching the anterior margin; scutellum strongly bigibbous; axillæ short; mesopleura with entire anterior margin broadly covered with light hair, but the posterior part is largely bare, and rugoso-punctate; tegulæ hairy in front; wings dilute brownish; second cubital cell broad (on one side very narrow, abnormal); tibiæ and basitarsi covered with appressed silvery hair; first abdominal segment dorsally covered with light hair, except a rather small median patch, which is not elongate laterally; bands on segments 2-6 very broad, even and entire; posterior lateral corners of black on second segment a little less than right angles; second and third ventral segments broadly covered with silvery hair.

Type: Male, No. 1600, Mus. Calif. Acad. Sci., Collected by E. P. Van Duzee, July 7, 1922, at **Vivian Park, Utah.**

Runs in my table to *T. trilobatus* Ckll., but differs in the ornamentation of thorax and other characters. The pattern of the pubescence is not very different from that of the much larger *T. concaevus* (Cress).

5. *Triepeolus pectoralis* (Robertson)

Utah. Saltair, July 12, 1922, 1 ♀ (Van Duzee); American Fork Cañon, July 25, 1922, 1 ♂ (Van Duzee). The female has the scape and base of flagellum bright ferruginous, and stripes on mesothorax not reaching anterior margin. The male has the scape black, base of flagellum obscure red, and stripes on the mesothorax practically going to anterior margin. Both have dusky red tegulæ, and lower part of pleura polished, with strong well separated punctures. The Colorado and Utah *T. pectoralis* are variable, but, at present, I cannot separate them from Robertson's Illinois species.

6. *Triepeolus schwarzi subcalens* Cockerell & Sandhouse,
new subspecies

Male (type): Smaller, length 7-8 mm.; labrum black with lower margin red, varying to all red; eyes pea-green; flagellum ferruginous on under side, and more or less above apically; longitudinal bands on mesothorax broad, reaching anterior margin, the spaces between these bands anteriorly, and also laterad of them, thinly hairy; dense hair covering pleura and thoracic venter pure white; stigma clear ferruginous; angles of black at sides of second abdominal segment sharp; light hair on second ventral segment having a broadly triangular outline. The legs are bright clear red with black spurs; the apical plate is narrow and red.

Female: Length 7.8 mm.; flattened area at the end of abdomen rather small, but of the typical *Triepeolus* type; face covered with pure white hair, dense at sides; labrum and mandibles red; clypeus minutely granular, with lower margin red, no smooth line; flagellum dusky reddish beneath, the sutures paler; stripes on mesothorax ochreous, better defined, with no evident pale hair between or laterad of them; pleura covered with hair; first three ventral segments with much white hair; last ventral segment red, black at base, the end conspicuously turned downward.

Type: Male, No. 1601, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 6, 1918, at Redding, California. *Paratypes*, two males, one female, same data.

Perhaps a distinct species, but so close to *T. schwarzi* Ckll. (described from Colorado), that it may for the present be regarded as a subspecies. The female of true *T. schwarzi* is not known. The female *subcalens* is so like *T. ancoratus* Ckll. that it can only be certainly distinguished by the conspicuously longer antennæ. Male *subcalens* resembles *T. balteatus* Ckll., but differs in having the disc of propodeum clothed with pale hairs (bare in *balteatus*), apical plate of abdomen narrower and lighter red, flagellum reddish beneath, mesothorax and scutellum with more widely separated punctures.

7. *Triepeolus inyoensis* Cockerell & Sandhouse, new species

Male: Length 11.3 mm.; black including antennæ, but flagellum obscurely reddened beneath; labrum entirely red, mandibles red with dark apices; tubercles black; tegulæ dull pale red; legs red, the anterior femora with basal two-thirds black in front, middle femora with only an obscure blackish stain above, hind femora suffusedly stained with blackish; spurs black. Face densely covered with pure white hair; eyes pale reddish; front with long hair; vertex hairy; ornaments of head and thorax

pale ochreous; upper border of prothorax densely covered with hair; mesothorax covered with coarse pale ochreous hair, with poorly defined trilobed black area on posterior disc, this being invaded by the longitudinal bands, which can be seen because a little denser and brighter than the surrounding hair; scutellum bilobed, with a wide central interval, which is hairy; axillæ short; mesopleura densely covered with pale ochreous hair; wings faintly tinged with brown; stigma red; hair on inner side of hind basitarsi pale orange; abdomen robust and subcylindrical; first segment above densely covered with ochreous hair, except a narrow transverse band, rounded at ends, much narrower than the ochreous band behind it; second segment with the lateral angles of the black produced, very acute, the oblique anterior extensions of pubescence very long, also a little pale hair basally in middle; apical band on segments 2-5 ochreous, very broad and even, but that on sixth segment white, contrasting; apical plate red, narrow; first ventral segment with a triangular patch of white hair; second and third segments covered with white hair in middle and apically at sides; sixth ventral segment with a transverse red band.

Type: Male, No. 1602, Mus. Calif. Acad. Sci., collected by Fordyce Grinnell Jr., August 15, 1914, at Pine Creek, Inyo Co., California, at 5,500 feet elevation.

A very distinct species, running out in my table near *T. balteatus* Ckll., from which it differs conspicuously in the markings of the abdomen.

8. *Triepeolus blaisdelli* Cockerell & Sandhouse, new species

Male: Length about 9 mm., rather slender; black, with labrum, mandibles (except apically), tegulæ and legs clear red; tubercles, axillæ and spurs black; eyes sea-green; antennæ dusky red, flagellar joints pallid apically; face densely covered with silver-white hair; lower margin of clypeus red; vertex closely and finely punctured; ornaments of head and thorax dorsally very pale, ochreous tinted, but the hair which densely covers the mesopleura pure white; upper border of prothorax densely covered with hair; mesothorax rough, black, narrowly bounded by hair at sides and posteriorly; a pair of well developed stripes, reaching anterior margin; middle of mesothorax posteriorly with a groove; scutellum feebly bilobed; axillæ short and obtuse; posterior face of thorax densely covered with white hair, except a small triangle below postscutellum; wings hyaline, very faintly brownish, stigma and nervures ferruginous; second cubital cell much narrowed above; all abdominal bands (including those on first segment) broad and entire; black area on first segment transverse, bow shaped, that is convex anteriorly, straight posteriorly, and pointed at each end; lateral corners of black on second segment very long and acute; apical plate dark red, narrow; venter with broad white

bands on second and third segments, that on second greatly enlarged in middle; fringes on fourth and fifth segments pale.

Type: Male, No. 1603, Mus. Calif. Acad. Sci., collected by F. E. Blaisdell, in September, at Mokelumne Hill, California, on flowers of *Eriogonum*. *Paratype*, one male, same data.

Runs in table near to *T. pænepectoralis* Viereck, but rather recalls *T. callopus* Ckll. It will be known by the dense white hair covering thorax laterally and posteriorly, reddish antennæ, etc. Another specimen lacking the abdomen, is from Cazadero, Calif., Sept. 2, 1918 (Van Duzee).

9. *Triepeolus hæmaturus* Cockerell & Sandhouse, n. sp.

Female: Length 9-10.5 mm.; black, with lower margin of clypeus (more narrowly in middle), labrum, mandibles (except apex), tegulæ, legs and the round false pygidium all red; tubercles, axillæ and spurs black, hind spurs long; eyes grey; hair about bases of antennæ pure white; vertex densely punctured; scape black with about the apical half in front red; flagellum obscurely red beneath, bright red basally; ornaments of head and thorax pale, slightly ochreous; hair-pattern of mesothorax rather indistinct, the two stripes short and not quite reaching anterior margin; scutellum moderately bigibbous, axillæ rather short; posterior face of thorax densely covered with light hair, except a narrow band in the middle; upper part of pleura densely hairy, the lower margin of the hair very concave; lower part of pleura granular, very densely rugosopunctate; wings brownish, stigma rufous with a dark margin; second cubital cell quite broad above; abdominal bands all broad and entire, sometimes a little notched in middle; black area on first segment a broad transverse band, rounded at ends; lower lateral corners of black on second segment produced and acute, the anterior lobes of pubescence pointed mesad; sides of the fifth segment with large patches of white tomentum; first ventral segment with an apical lunule of white hair, second covered with white hair in middle and with broad apical band laterally, third with broad apical band; fourth segment red, with white tomentum, narrowed in middle; fifth red, with a trilobed basal black mark, or the base with a black band.

Type: Female, No. 1604, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 12, 1922, at Saltair, Utah. *Paratypes*, two females, same data.

Related to *T. perelegans* Ckll. from Arizona, but readily known by the different sculpture of pleura, and largely black scape. It differs from *T. ancoratus* Ckll. by the bare space on pleura.

10. *Triepeolus rectangularis* Cockerell

Utah: Mt. Timpanogos, July 8, 1922, 1 ♂ (Van Duzee); Oregon: Wallowa Mts., Baker Co., July 6, 1922, 1 ♂ (Van Dyke). California: Huntington Lake, Fresno Co., 7000 ft., July 15, 1919, 1 ♂ (Van Duzee). The specimens have the antennæ black with at most a little obscure red on third joint.

11. *Triepeolus saturninus* Cockerell & Sandhouse, n. sp.

Male: Length about 10 mm.; black, including antennæ (except a small red spot on apical part of third joint externally), labrum (except an obscure red spot at each side), mandibles (except a bright red band in middle), tubercles and axillæ; tegulæ clear red; femora black, but knees, tibiæ and tarsi red; hind spurs black; hair on inner side of hind basitarsi, orange; eyes bright pea-green; face with pure white hair round antennæ, but on front it is long and pale brown; vertex densely punctured; ornaments of head and thorax pale ochreous, distinctly so on pleura, and quite strongly ochreous on abdomen, but dense hair on front of hind coxæ pure white; mesothorax coarsely punctured, with an ochreous marginal band, lacking only in middle anteriorly, between the longitudinal stripes; stripes broad, parallel, reaching margin, where they are connected with lateral patches by the marginal band; scutellum bigibbous; axillæ prominent; area of metathorax bare, broadly produced apically; pleura covered with hair; wings brownish, stigma black; spurs on anterior and middle legs red, on hind legs dark; transverse black area on first segment broad, squarely truncate at ends, the middle abruptly swollen (thus the whole suggesting the planet Saturn with its rings, only the rings much broader), and emitting at right angles a broad band anteriorly, and posteriorly a linear one, cutting the apical pale band; black area on second segment with much the same shape, being swollen in middle (so that its posterior margin is undulating), its outer corners obtusely rounded, and the anterior extension of pubescence prolonged mesad as long slender sharp thorn-shaped lobes; all the other bands of pubescence broad and entire; apical plate moderately broad, obscure reddish apically; venter with pale bands, and outstanding fringes pale.

Type: Male, No. 1605, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, September 1, 1912, at **Millbrae, San Mateo Co., California.**

Runs in my table to *T. schwarzi*, but easily separated by the black femora and other characters.

12. *Triepeolus brunnescens* Cockerell & Sandhouse, n. sp.

Male: Length about 9.5 mm.; black with both ends of scape, and the flagellum beneath, dusky red; labrum black with a longitudinal band of white pubescence in middle; mandibles with basal half red; tubercles and axillæ black; tegulæ clear apricot-color; legs bright red; spurs red, the hind ones darkened; eyes grey; face densely covered with pure white hair; vertex laterad of ocelli polished, with few punctures; black parts of head and thorax reddish from fine tomentum; ornaments pale ochreous; mesothoracic stripes very broad in middle, pointed behind, anteriorly not quite reaching margin, laterally, some distance from margin, connected by an isthmus of very thin hair with the triangular patches of anterior corners of mesothorax; scutellum strongly bilobed; axillæ prominent; area of the mesothorax shining and bare; pleura covered with hair, but it is thin on disc; wings brownish, stigma dark rufous; first abdominal segment with anterior bands narrowly broken; dark area on first segment a transverse band with fusiform outline, the ends pointed but not very acute; bands on second and third segments rather narrow, curved so as to leave a narrow brown marginal area; lower apical angles of dark area on second segment acute, the lobes of hair arising from the band like obliquely placed triangles, one corner confluent with the band; all the bands except on first segment entire; apical plate rather broad, black; venter dark reddish, the second and third segments with dense pure white hair-bands, the outstanding fringes yellowish.

Type: Male, No. 1606, Mus. Calif. Acad. Sci., collected by F. E. Blaisdell, September 10, 1884, at Poway, San Diego Co., California.

This may be compared with *T. brunneus* Ckll., from Colorado, but is easily distinguished by the pleura and pattern of abdomen.

13. *Triepeolus mensæ* Cockerell, new species

Male: Length about 9.5 mm. Similar to *T. schwarzi subcalens*, but larger, with pale purplish-grey eyes, broader face, forwardly directed points of anchor-shaped black area on mesothorax broad and obtuse instead of acute; second cubital cell as broad above as third and receiving recurrent nervure beyond its middle; anterior lobes of pubescence at sides of second abdominal segment very broad; apical plates darker, with piceous margin; axillæ longer.

The labrum is entirely red, and the flagellum bright ferruginous beneath; the clypeus is black. The femora, tibiæ and tarsi are entirely clear red.

Type: Male, No. 1607, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, June 21, 1922, on the high tableland at Warner Lake, Lake Co., Oregon.

In my table this runs to *T. schwarzi*.

14. *Triepeolus diversipes* Cockerell, new species

Male: Length about 11 mm.; black, including antennæ (third joint red on outer face and anteriorly at apex), labrum, mandibles (except red band in middle), tubercles and axillæ; tegulæ piceous with broad suffused reddish brown margins; anterior femora and tibiæ black, the latter covered with short silvery hair; anterior tarsi red; middle and hind legs clear red, spurs black; eyes pale greyish green; face densely covered with pure white hair; vertex rugoso-punctate; ornaments of head and thorax very pale, faintly creamy; mesothoracic stripes flame-like, tapering posteriorly, broadening toward base, reaching anterior margin, and on each side sending a bridge (separated from margin) to lateral patches, all these markings dull and inconspicuous; scutellum strongly bilobed, axillæ well developed; area of metathorax bare; pleura largely covered with greyish white hair, with a round bare space below wings, and a larger, ill-defined bare patch below middle, this latter area with a little hair scattered over its surface; wings slightly dusky, stigma black; abdominal bands entire, except on first segment where the basal band is rather widely interrupted, and the apical one is deeply notched before and behind; transverse black area on first segment a very broad band, very obliquely truncate at ends; anterior lobes of pubescence on second segment shaped like the end of a finger, the lateral apical corners of the black area broadly rounded and a little less than right angles; apical plate rather narrow, black with apical part red; ventral segments 2 and 3 with clear white marginal bands, not enlarged in middle; first outstanding fringe dark in middle and pale at sides, second dark.

Type: Male, No. 1608, Mus. Calif. Acad. Sci., collected by G. R. Pilate, October 25, 1909, at San Pedro, California.

The specimen was presented to the Academy by E. C. Van Dyke. In my key runs to *T. dichropus* Ckll., which is allied, but differs in the details of the markings.

15. *Epeolus rufomaculatus* Cockerell & Sandhouse, n. sp.

Female (type): Length about 8 mm., black, including antennæ, but scape dull red at end; labrum black, mandibles red; tubercles and tegulæ red, axillæ black; femora black, but knees, tibiæ and tarsi chestnut red; spurs dull white; eyes pale grey; head very broad; dense white hair around base of antennæ; clypeus entirely black, very densely and minutely

punctured, with no smooth line; vertex rugoso-punctate; ornaments of head and thorax very pale ochreous; mesothorax and scutellum entirely dull, minutely rugose; mesothorax bounded with light hair and with a large H-like mark anteriorly, but all these hair markings are dull and rather indistinct; scutellum weakly bigibbous; axillæ prominent; area of metathorax large, black and bare; upper half of pleura covered with light hair, lower part bare and very densely punctured; wings with the apical margin broadly pale brown; stigma black; second cubital cell receiving recurrent nervure beyond middle; hind tibiæ robust, blackened behind; hair bands of abdomen dull but clear-cut; basal band of first segment entire, but apical band widely interrupted; black area of first segment a broad parallel-sided band, the ends obliquely truncate; band on second segment moderately interrupted in middle, the mesal ends somewhat bulbous in outline; on each side anteriorly the band is contiguous with a large round spot; band on third segment narrowly interrupted in middle, and deeply constricted sublaterally; band on fourth segment also constricted at sides, but continuous in middle; fifth segment with a silvery apical lunule, and a large ferruginous patch on each side; venter with a broad white band, occupying two segments.

Male: Similar, except for the sexual characters; apical plate black and rather broad; knees, tibiæ at apex, and tarsi red; but tibiæ mainly black; second and third ventral segments with broad white bands, each having in the middle a dark elongated mark. Venation normal. Eyes green.

Type: Female, No. 1609, Mus. Calif. Acad. Sci., collected by E. P. Van Duzec, July 14, 1922, at Logan, Utah. *Paratypes*, three males, Millbrae, Calif., September 1, 1912, (E. C. Van Dyke); one male, Millbrae, Calif., September 1, 1912, (F. E. Blaisdell); Pacific Grove, Monterey Co., Calif., September, 1920, (F. E. Blaisdell).

Closely related to *E. asperatus* Ckll., from Los Angeles, but peculiar for the larger axillæ, red spots at end of abdomen, and abdominal markings. This refers to the female; the males from such an entirely different region and environment, may prove to belong to another species, when the female is discovered at Millbrae or Pacific Grove. At the same time there is no valid basis for treating the male as distinct.

16. *Epeolus geminatus* Cockerell & Sandhouse, new species

Female (type): Length 7.7 mm.; robust, black, including antennæ, except that apex of scape and second and third joints in front are rather dark red; labrum dark, shining and distinctly punctured; mandibles red; tubercles and tegulæ bright red, axillæ black; femora black, but knees, tibiæ and tarsi bright red, the hind tibiæ largely black; eyes purplish;

clypeus entirely black; face with white hair; vertex densely and very coarsely punctured; mesothorax anteriorly with a pair of converging and broadly contiguous claviform light ochreous hair-stripes, narrowly reaching anterior margin, and thus enclosing a black triangular area; hair of upper margin of prothorax, sides of mesothorax (broadly) and hind margin (narrowly) paler than the converging stripes; scutellum weakly bigibbous, densely rugoso-punctate, axillæ prominent; light hair of postscutellum interrupted in middle; pleura with less than upper half covered with white hair, the lower edge of the white concave; lower part of pleura very coarsely and densely punctured; wings dusky in apical field, stigma black; spurs pale ferruginous; ornaments of abdomen ochreous on first three segments, becoming almost white beyond, but the transition gradual and the last band not clear white; apical band on first segment broadly interrupted; black area on first segment transverse, obliquely truncate at sides, its median portion anteriorly with convex outline; band on second segment rather narrowly interrupted, subclavate, laterally the band rapidly broadens, but the posterior apical corners of the black are rounded and much wider than a right angle; bands on segments 3 to 5 narrowly interrupted in middle, but not sublaterally; fifth segment with the usual silvery lunule; ventral segments 2 to 4 with apical pure white bands.

Male: Similar to the female in most respects. Antennæ black, with flagellum very obscurely red beneath; pleura more or less hairy all over, but the hair thin in middle; pale hair at base of first abdominal segment interrupted in middle; apical plate very broad, black with red margin; bands on mesothorax in front more broadly united.

Type: Female, No. 1610, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, September 12, 1923, at **Mill Creek Canyon, San Bernardino Co., California**. *Paratype*, one male, Cascada, Fresno Co., Calif., 6,000 feet elevation, July 29, 1919 (Van Duzee).

A distinct little species, recognizable by the V-shaped mark on thorax anteriorly.

17. *Epeolus heterurus* Cockerell & Sandhouse, new species

Female (type): Length a little over 8 mm.; black including antennæ, labrum, mandibles (except an obscure reddish mark in middle), axillæ, tubercles, legs and spurs, but small joints of tarsi red; ornaments of head and thorax pale ochreous; eyes green, with the lower third purplish-grey; clypeus very finely and densely punctured, with no median line; pale hair about base of antennæ greyish, not white; vertex finely punctured; mesothorax at sides and posteriorly margined with dull ochreous hair, and a pair of stripes of the same on anterior middle, pointed at each end, isolated and not quite reaching the anterior margin; a slender

transverse stripe along anterior margin of scutellum; scutellum not evidently bigibbous; axillæ not projecting; bare area of metathorax forming a deeper triangle than usual; mesopleura coarsely hairy behind tubercles, and with a broad transverse band of hair, narrowing posteriorly; lower part of pleura densely punctured; tegulæ black with narrow reddened margins; wings brownish, stigma black; abdominal bands entire, except apical one on first segment, which is narrowly interrupted; black area on first segment a transverse band, pointed at each end, anteriorly in middle the black extends abruptly as a rounded lobe; lower lateral angles of black on second segment acute; fifth segment with no silvery lunule, but on each side a large patch of seal brown pubescence, these patches connected posteriorly across the middle; second and third ventral segments with narrow rather inconspicuous pale hair-bands.

Male: Similar, but eyes entirely deep pea-green; mesothorax anteriorly hairy, limiting the black to a large trilobed area; apical band of first abdominal segment sometimes not interrupted; mesopleura covered with pale hair. The maxillary palpi (examined in *Colestin* specimen) have one long free joint, as in *Epeolus*.

Type: Female, No. 1611, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 6, 1918, at Redding, California. *Paratypes*, one female, Cayton, Shasta Co., Calif., July 9, 1918 (E. P. Van Duzee); hills back of Oakland, Calif., August 2, 1908 (Van Dyke); San Diego, Calif., May 10, 1891 (F. E. Blaisdell); Wallowa Mts., Baker Co., Oregon, July 5, 1922, one female (Van Dyke); *Colestin*, Jackson Co., Oregon, August 1, 1918, one male (E. P. Van Duzee).

The association of the sexes is apparently correct, but is subject to further investigation. The species is readily recognized in the female by the patch on the fifth abdominal segment, and the black legs with the small joints of tarsi red. There is some affinity with *E. pusillus* Cresson, but that has red legs.

18. *Epeolus melectimimus* Cockerell & Sandhouse, n. sp.

Male: Length about 8 mm., rather slender; black, including antennæ (flagellum thick, with truncate shining end), labrum, base of mandibles (but apex broadly chestnut red), tubercles, tegulæ, axillæ, legs (except small joints of tarsi, which are deep rufous) and spurs; eyes dark grey; face broad, rather obscure pale hair about bases of antennæ; mesothorax densely and coarsely punctured, but shining between the punctures; on anterior middle is a very inconspicuous patch of greyish hair, with three short lobes pointing backward; laterally this connects with patches of anterior corners by narrow band along front margin of mesothorax; scutellum strongly bilobed, axillæ obtuse; area of metathorax bare; pleura very

densely punctured, nearly all bare, upper portion thinly hairy below and behind tubercles; also hairy just below wings; wings strongly brownish, stigma black; marginal cell normal for the genus, minutely appendiculate; second cubital receiving recurrent nervure beyond middle; ornaments of abdomen dull whitish, the bands all interrupted except the basal one on first segment, apical one on first segment widely interrupted; black area on first segment large, lenticular in outline, with pointed ends; interrupted band on second segment with each division clavate mesially, and above (basad) emitting a lobe which makes the posterior lateral angles of the black acute; third segment with each half of the band divided into two large spots; fourth with the pair of mesal spots well developed, but the lateral ones reduced to hardly perceptible marks; fifth with only the inner spots; sixth without spots; apical plate black, with conical outline; light bands on ventral segments 2 and 3 reduced to transverse marks on each side; outstanding fringes black.

Type: Male, No. 1612, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 7, 1919, at **Huntington Lake, Fresno Co., California**, at an elevation of 7,000 feet.

A peculiar species resembling a small *Pseudomelecta*, but readily distinguished from that genus by the marginal cell.

19. *Epeolus rubrostrictus* Cockerell & Sandhouse, n. sp.

Female: Length nearly 8 mm.; black, including antennæ, labrum and axillæ, but mandibles bright red except at extreme base, tubercles clear red; legs black, with knees, tibiæ at apex and tarsi red, the hind basitarsi blackened on outer side; face broad, white hair around antennæ, but clypeus with thin grey hair, its surface very densely and minutely punctured; third antennal joint longer than fourth; eyes brownish-grey; vertex dull and rough, a shining spot immediately laterad of each lateral ocellus; upper border of prothorax hardly hairy; mesothorax coarsely rugose, with a median shining groove; stripes of mesothorax narrow, far apart, warm ochreous, reaching anterior margin, where they extend laterad, but they do not approach the patches at anterior corners; scutellum bigibbous, axillæ rather prominent; area of metathorax large and bare; pleura with upper part densely hairy, except a patch below wings, lower part with a large bare patch, which is extremely densely punctured; tegulæ bright apricot-color; wings broadly dusky apically, stigma dark red; spurs very pale reddish; markings of abdomen very clear-cut, very pale, faintly ochreous; basal band on first segment entire, apical band widely interrupted; transverse black band on first segment very broad, obliquely truncate at ends, its anterior margin undulate; band on second segment widely interrupted, the sections subclavate mesad, and laterally with a pointed projection, leaving the posterior lateral corners of the black very broadly rounded, and a little less open than a right angle;

band on third segment broken into four large transverse spots; band on fourth segment similar, but the median pair of spots narrowly united in middle; fifth with two patches only, connected in the middle by a bridge of brownish hair, and with the usual silvery lunule; second and third ventral segments thinly greyish-hairy, and with interrupted white bands, the sections placed obliquely.

Type: Female, No. 1613, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 24, 1920, at **Nanaimo Biological Station, British Columbia.**

In the interrupted abdominal bands, and widely separated stripes on mesothorax, this resembles *E. humillimus* Ckll., from Washington State. It will be recognized especially by the black antennæ, red tubercles, and coloration of legs. The markings of the mesothorax readily distinguish it from *E. asperatus* Ckll.

20. *Epeolus arciferus* Cockerell, new species

Female: Length about 8 mm.; black, including antennæ, labrum (which is shining), mandibles (except red band in middle), tubercles and axillæ; tegulæ obscure red, black at base; legs black with tibiæ at apex and the tarsi red; eyes deep olive green; light hair of mesothorax fulvous, in place of the two stripes a high broad arch resulting from the union of the stripes posteriorly. Allied to *E. geminatus*, but easily separated by the following characters; tibiæ black except at end; tegulæ much darker (clear red in *geminatus*); labrum black; hair on mesothorax (arch and margins) fulvous, the enclosed area in front not so sharply defined and not distinctly triangular, while the anterior arms of the arch, joining the margin, are very broad, and separated by only a short interval from the much more extended lateral patches; axillæ less prominent; marginal cell less truncate at end; hair of upper part of pleura ochreous, the lower part bare in middle, where it is densely punctured and shining between the punctures; hair band on posterior part of scutellum fulvous and entire (white and interrupted in *geminatus*); black transverse band on first abdominal segment with anterior margin straight; lower apical angles of black on second segment distinctly acute; band on fourth segment entire (on third with linear interruption). As in *E. geminatus*, the venter has white bands on segments 2 to 4, but that on second is emarginate anteriorly in middle.

Type: Female, No. 1614, Mus. Calif. Acad. Sci., collected by F. E. Blaisdell, in September, 1920, at **Pacific Grove, Monterey Co., California.**

21. *Epeolus pilatei* Cockerell, new species

Female: Length about 9 mm.; black, including antennæ, labrum (which is shining), base of mandibles (but rest red), tubercles, axillæ and legs (small joints of tarsi obscurely reddish); tegulæ black with obscurely red margin; eyes yellowish-green; pure white hair about base of antennæ; clypeus dull with no smooth line; vertex rugose; fulvous band of upper border of prothorax interrupted in middle; light hair of mesothorax, scutellum (the band entire) and postscutellum fulvous; stripes on mesothorax parallel, far apart, reaching margin not far from the large (triangular) lateral patches; posteriorly the stripes are united by a transverse band, so that they enclose a quadrate space; scutellum hardly bigibbous; axillæ rather prominent; basal area of metathorax bare; upper part of pleura covered with rather shaggy ochreous hair, lower part with a large round bare area, which is very densely punctured; wings strongly brownish, stigma black; marginal cell abruptly truncate; spurs dark; abdominal bands warm ochreous, basal one on first segment entire, but the apical broadly interrupted; transverse black band on first segment very broad, its anterior margin practically straight, its ends very broadly somewhat obliquely truncate; band on second segment more narrowly interrupted, its sections claviform, the lower apical corners of the black precisely rectangular, not rounded; band on third segment strongly undulate but not interrupted, on fourth similar; fifth with a pair of whitish patches and silvery lunule; venter with white bands on second and third segments.

Type: Female, No. 1615, Mus. Calif. Acad. Sci., collected by G. R. Pilate, October 25, 1909, at **San Pedro, California**, and presented to the Academy by Dr. E. C. Van Dyke.

Recognizable by the black legs and peculiar mark on mesothorax.

In addition to the above, there are four or five species of *Epeolus* represented by rather inadequate material, which have been set aside in the hope that more specimens will be obtained, permitting fuller or more accurate diagnoses.

The species of *Epeolines* recorded above may be readily separated thus:

Legs (at least femora and tibiæ) black.....	1
Legs (at least tibiæ and tarsi) red.....	12
1. Females	2
Males	8

- 2. Black area on disc of first abdominal segment shorter than the distance from its ends to sides of segment; large species.....
 *T. concavus* (Cresson)
 Black transverse area on disc of first abdominal segment much longer than distance from its ends to sides of segment; smaller species 3
- 3. Clypeus with a median smooth line.....*T. lineatulus* n. sp.
 Clypeus without a median smooth line..... 4
- 4. Posterior lateral corners of black on second abdominal segment approximately rectangular 5
 Posterior lateral corners of black on second abdominal segment pointed, much less than rectangular..... 7
- 5. Fifth abdominal segment with a large rounded flattened surface; larger species.....*T. vandykei* n. sp.
 Fifth abdominal segment with an apical silvery lunule or band... 6
- 6. Tegulae very dark, with dark reddish margins....*E. pilatei* n. sp.
 Tegulae bright ferruginous.....*E. rubrostrictus* n. sp.
- 7. Fifth abdominal segment with two round patches of brownish hair, connected in the middle, and no silvery lunule or band.....
 *E. heterurus* n. sp.
 Fifth abdominal segment with an apical silvery lunule.....
 *E. arciferus* n. sp.
- 8. (Males). Abdominal segments beyond second with light spots instead of bands.....*E. melectimimus* n. sp.
 Abdominal segments beyond second with entire bands..... 9
- 9. Dark area on disc of first abdominal segment small, not transverse*T. pallidiventris* n. sp.
 Dark area on disc of first abdominal segment a broad transverse band 10
- 10. Lower lateral corners of black on second segment approximately rectangular; transverse black area on first segment comparatively short and broad, with oblique ends, and posterior middle angulate*E. heterurus* n. sp.
 Lower lateral corners of black on second segment less than rectangular; transverse black area on first segment long and parallel-sided 11
- 11. Mesopleura largely dark; larger species.....*T. lineatulus* n. sp.
 Mesopleura densely covered with white hair; smaller species.....
 *T. rectangularis* Ckll.
- 12. Femora black..... 13
 Anterior femora and tibiae black, middle and hind femora and tibiae red.....*T. diversipes* n. sp.
 Femora red 20

13. Females 14
 Males 16
14. Bands on abdominal segments 3 and 4 divided laterally.....
*E. rubrostictus* n. sp.
 Bands on segments 3 and 4 not divided laterally..... 15
15. Light hair on anterior middle of mesothorax forming a V.....
*E. geminatus* n. sp.
 Light hair on mesothorax not forming a V *E. rufomaculatus* n. sp.
16. (Males). Apical plate of abdomen very broad; anterior marks
 on mesothorax contiguous.....*E. geminatus* n. sp.
 Apical plate not thus broad, and mesothorax not thus marked in
 front 17
17. Apical plate clear bright red.....*E. sp.*
 Apical plate dark 18
18. Mesothorax covered with pale hair.....*E. sp.*
 Mesothorax not covered with pale hair..... 19
19. Transverse black area on first abdominal segment emitting median
 black bands anteriorly and posteriorly; pale hair above band on
 second segment extended mesad into sharp slender points.....
*T. saturninus* n. sp.
 Base of first abdominal segment before transverse band not broken
 by a black band.....*E. rufomaculatus* n. sp.
20. Females 21
 Males 24
21. Basal pubescence of first abdominal segment broadly interrupted
 by a median dark band; scape entirely red....*T. pectoralis* Rob.
 Basal pubescence of first abdominal segment continuous right
 across 22
22. Clypeus entirely black.....*E. sp.*
 Clypeus with lower edge red..... 23
23. Mesothorax covered with light hair *T. schwarzi subcalens* n. sub sp.
 Mesothorax with a large bare patch; pygidial area red.....
*T. hamaturus* n. sp.
24. (Males). Posterior light band on first abdominal segment quite
 entire; spurs black..... 25
 Posterior light band on first abdominal segment interrupted or
 deeply notched (in latter case mesothorax without well defined
 stripes) 28
25. Mesothorax with two well defined longitudinal pale bars; meso-
 pleura covered with light hair; scape largely red.....
*T. blaisdelli* n. sp.
 (*T. mensæ* n. sp. if run here, is separated by the shorter, entirely
 black scape, but in pattern of mesothorax it falls better with the
 next division).
 Mesothorax with more blurred or indistinct marking..... 26

26. Larger; black transverse band on first segment very slender.....
*T. inyoensis* n. sp.
 Smaller; black band less slender..... 27
27. Eyes green.....*T. schwarzi subcalens* n. sp.
 Eyes pale purplish grey.....*T. mensæ* n. sp.
28. Light longitudinal bars on mesothorax sharply defined..... 29
 Markings of mesothorax suffused or poorly defined; spurs red;
 scape black*T. sp.*
29. Scape pure black; abdominal bands ochreous....*T. pectoralis* Rob.
 Scape reddened; abdominal bands very pale..... 30
30. Sides of second segment before band with large inwardly directed
 patches of pubescence.....*T. brunnescens* n. sp.
 Sides of second segment without such patches.....*E. sp.*

MELECTINÆ

22. *Zacosmia maculata* (Cresson)

California: San Diego, July 2-3, 1891. (Blaisdell);
 Colton, May 26-28, 1917 (Van Duzee). Females.

23. *Zacosmia maculata desertorum* Cockerell

California: Fresno Co., 1 ♂ (Van Dyke).

24. *Pseudomelecta pasadenensis* Cockerell

California: San Francisco Co., 1 ♀, 2 ♂ (Blaisdell).

The male differs from the male of *P. californica* in the same manner as the female. *Melecta sladeni* Viereck, Canad. Entom., LVI. Jan. 1924, appears to be identical with *P. pasadenensis*, the description showing no difference.

25. *Pseudomelecta californica* (Cresson)

Arizona: Cochise Co., June 23, 1916 (V. W. Owen).
 Oregon: Colestin (Van Duzee); Sparta and Warner Mts. (Van Dyke). California: Abundant and widely distributed; taken by E. P. Van Duzee at Millbrae, San Bruno Hills (San Mateo Co.), Berkeley, Pleyto, Mill Creek Canyon (San Ber-

nardino Co.), Los Angeles, Colton, and Keen Camp (Riverside Co.). Taken by Dr. E. C. Van Dyke at Strawberry Valley (Eldorado Co.), hills back of Oakland, Yosemite Valley, Kings River Canyon, and Fallen Leaf Lake (Lake Tahoe); by F. E. Blaisdell at Mokelumne Hill, Pacific Grove, Poway (San Diego Co.) and San Diego; by J. A. Kusche in Sonoma Co.; by F. C. Clark at Santa Monica and Huntington Lake; by C. L. Fox at Mono Lake.